

Comparison of Fetal Heart Rate Patterns and Acid-Base Balance between Early and Late Rupture of the Membranes

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Artificial rupture of the membranes is one of the most widely used method for induction of labor. Its effect on the fetus, however, has not been fully investigated. The effects of early and late rupture of the membranes were studied.

Subject and Method: The thirty-two patients are all multiparous at term without known complications, and induced electively with artificial rupture of the membranes and continuous infusion of oxytocin and prostaglandin $F_{2\alpha}$. Early rupture group is consisted of 16 patients where labor was induced with artificial rupture of the membranes followed by the above combination of oxytocics, whereas in late rupture group of 16 patients with the combination of oxytocics followed by artificial membrane rupture after the cervical dilatation of more than 5cm. FHR was monitored using Corometrics FMS 111 from the start of induction until delivery, directly with spiral electrode in all patients after the membrane rupture, except in late rupture group where indirect technic was used until the rupture. All cases had balanced analgesia and anesthesia. At the time of delivery, umbilical blood specimens were taken for gas and acid-base determinations. FHR patterns were compared in terms of baseline level, long term variability, acceleration, early, variable and late decelerations at three phases of labor, namely before 5cm, 5 to 7cm, and after 8cm of cervical dilatation, which were further devided into 20-minute segments for the evaluation of findings. When positive findings of FHR patterns were noted in more than 50% of the 20-minute segment, the segment was judged positive. Those positive segments were expressed in percentage among each phase.

Result: Variables of the two groups were not statistically different except the cervical dilatation at the time of artificial rupture of the membranes, 2.8 ± 0.8 cm (M \pm SD) in early rupture group and 5.1 ± 0.3 cm in late rupture group, respectively. Interval from membrane rupture to delivery was 3 hours 34 minutes \pm 1 hour 3 minutes in early rupture group and 2 hour 6 minutes \pm 1 hour 9 minutes in late rupture group, interval from infusion to delivery was 3 hours 4 minute \pm 1 hour 5 minutes and 3 hours 5 minutes \pm 1 hour 25 minutes, duration of the 2nd stage was 8.1 ± 4.4 minutes and 6.7 ± 4.2 minutes, station of the presenting part at the time of membrane rupture was sp-2.2 \pm 0.9cm and sp-1.9 \pm 0.8cm, respectively. Meconium staining of the amniotic fluid at the time of membrane rupture was not seen in any, cord entanglement was noted in 50% of the cases in both groups, and Apgar score at one minute was more than 7 in all cases. The incidence of loss of long term variability and early deceleration increased significantly in early rupture group as labor progressed. Significant decrease was noted in the incidence of acceleration, and increase in early and variable decelerations with progress of labor in late

rupture group. There were significantly higher incidence of acceleration at cervical dilatation of less than 5cm and variable deceleration at more than 5cm, and significantly lower incidence of tachycardia at less than 5cm and acceleration at more than 8cm in late rupture than in early rupture group. Umbilical artery blood P_{CO_2} and HCO_3 values were significantly higher in late rupture group (51.9 ± 10.8 mmHg and 23.6 ± 2.6 mEq/L) than in early rupture group (44.8 ± 4.2 mmHg and 21.2 ± 1.5 mEq/L). Other blood gas and acid-base parameters were not significantly different between the two groups.

Comments: At the late phase of the first stage, significantly lower incidence of acceleration and higher incidence of variable deceleration were noted in the late rupture group than in the early rupture group. It might be suggested that the fetus in late rupture group could have more abrupt stress at later phase of labor, judging from the FHR differences and respiratory acidotic tendency. However, these effects seem to be too subtle to show clinical difference of suppression.

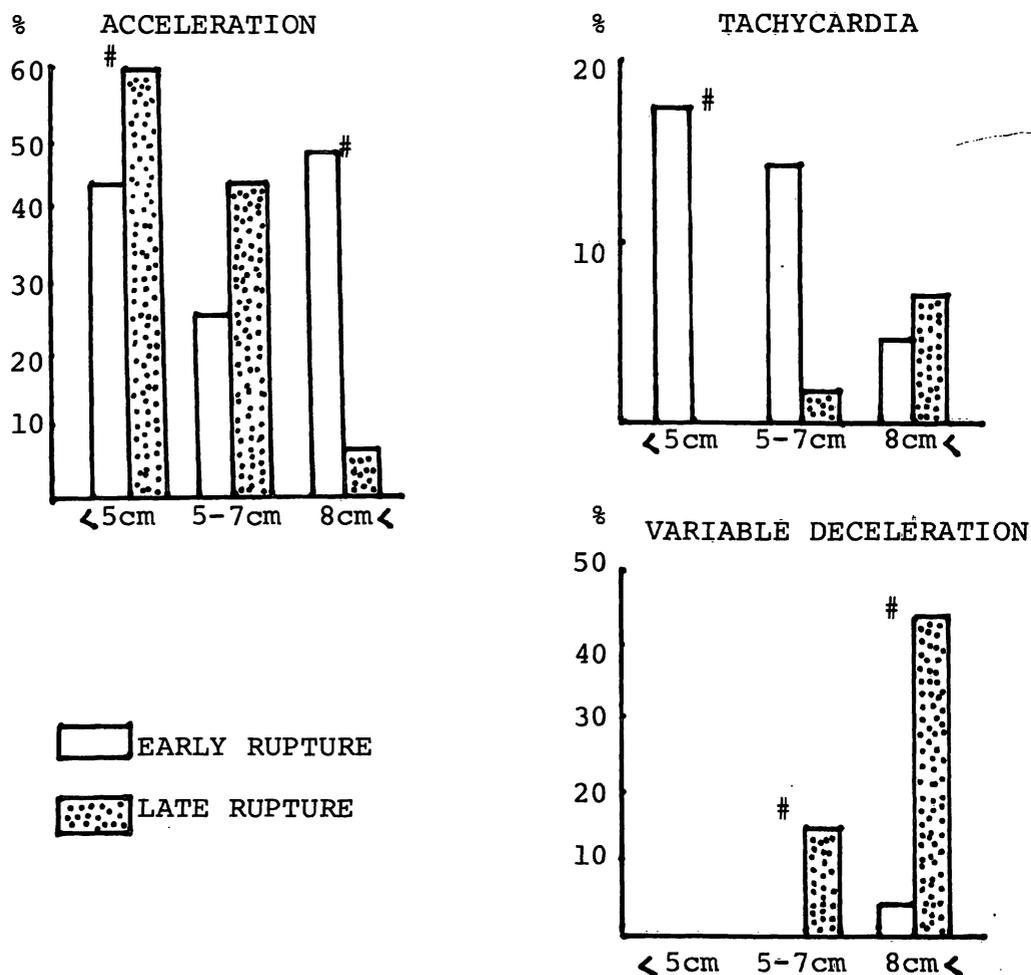


Figure 1. Shown are the FHR patterns where significant differences of incidence (#) were noted between early and late rupture of the membranes.

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